Defense Industrial Base Capabilities Study (DIBCS) Series

Armed Forces Communications and Electronics Association (AFCEA)
Bonn Chapter

DUSD (Industrial Policy)

April 27, 2005

Agenda

- Introduction: The Functional Capability Concept and its Role in Industrial Base Planning
- The Defense Industrial Base Capabilities Study (DIBCS) Methodology & Findings
- What Else Have We Learned?
- The DIBCS Series as a Strategic and Planning Tool

Why is DUSD (Industrial Policy) Uniquely Positioned to Shape Defense Industry?

In support of industrial base policy formulation, ODUSD(IP) has a major role in:

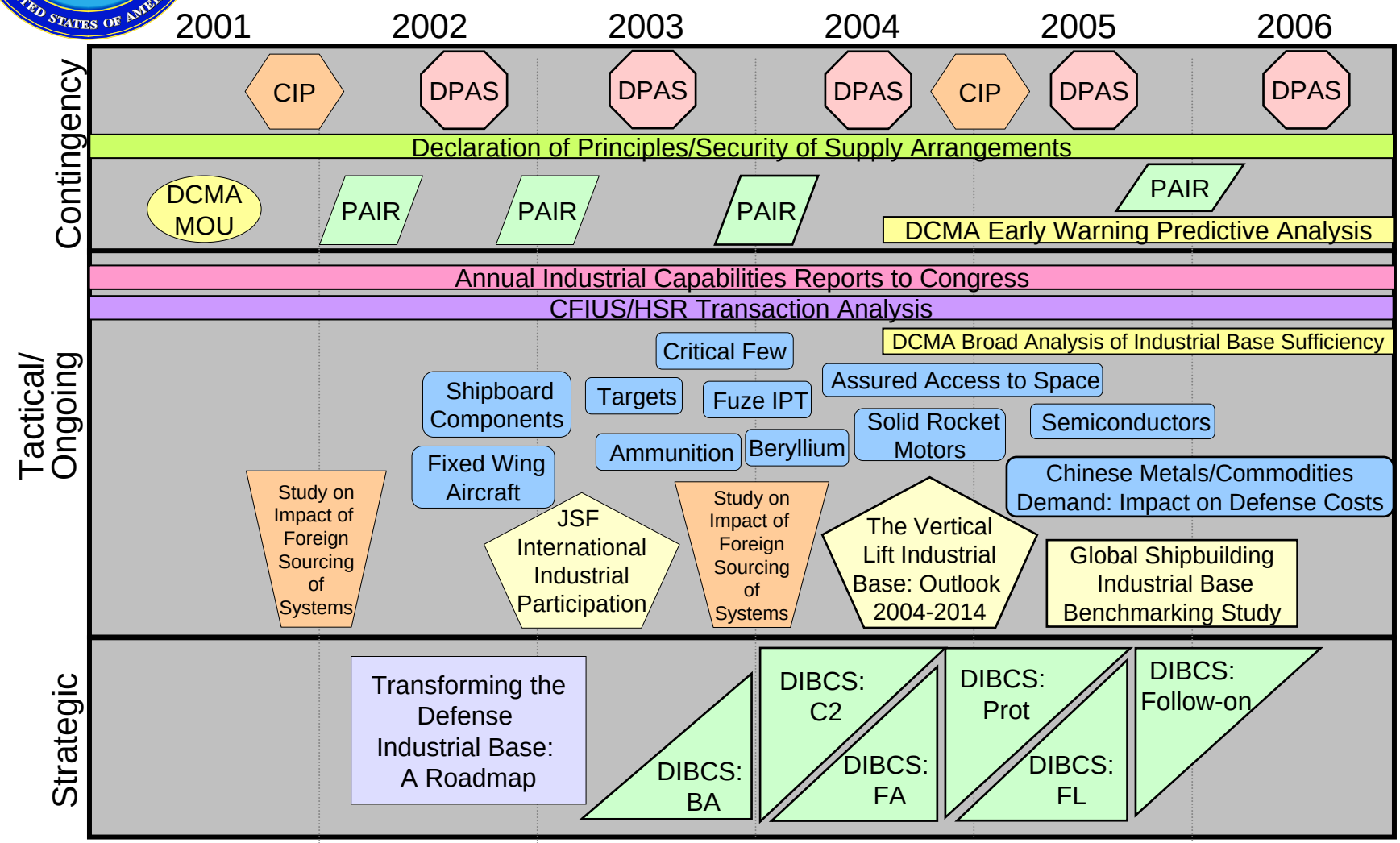
- Weapon System Acquisition Decisions
  - Milestones and Program Reviews
  - Acquisition Strategies
- Merger and Acquisition Reviews
  - Hart-Scott-Rodino
  - Exon-Florio
- Defense Priority and Allocations System (DPAS)/Priority Allocation of Industrial Resources (PAIR)

DUSD (Industrial Policy) Works in Conjunction with Other AT&L Staff

Situated on staff of Under Secretary of Defense (Acquisition, Technology, & Logistics) with:

- Director, Defense Research & Engineering - ensures superior and affordable technology to support warfighters with revolutionary, war-winning capabilities
- Director, Defense Systems - provides technical and programmatic evaluation, and acquisition oversight, for strategic and tactical programs
- Director, Acquisition Resources & Analyses - integrates and manages diverse AT&L resources to support National Strategy; manages DAES, DABs, EVMS, SARs/CARs, Nunn-McCurdy
- Director, Defense Procurement and Acquisition Policy - develops acquisition policies and practices to promote flexibility and take advantage of the global marketplace
- Director, International Cooperation - lead for global outreach, international agreements
- Office of the General Counsel - serves as DoD point of contact for Hart-Scott-Rodino, legal support for CFIUS

Industrial Base Activities



Key:

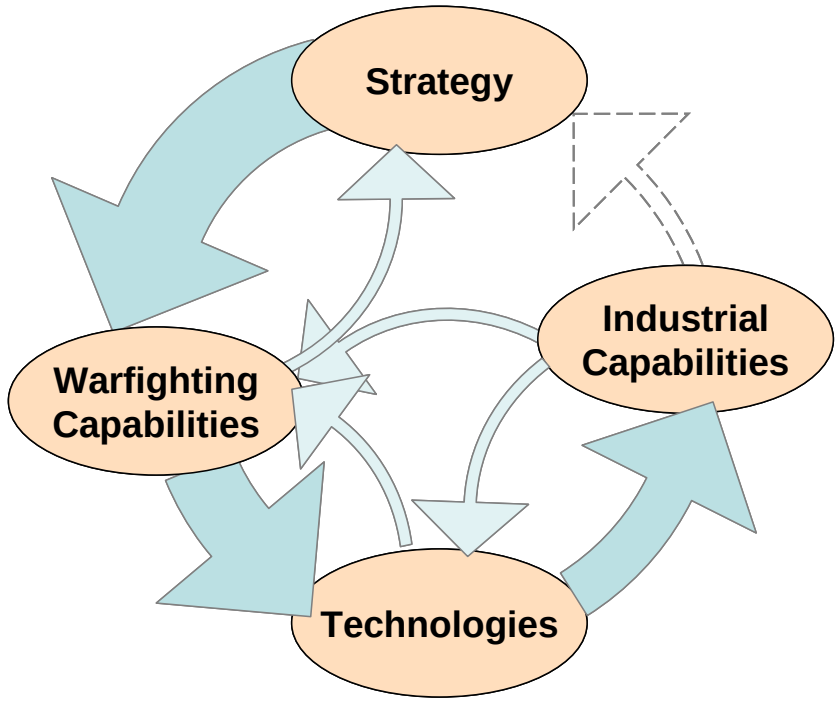
DCMA = Defense Contract Management Agency
CIP = Critical Infrastructure Program
PAIR = Priority Allocation of Industrial Resources
DPAS = Defense Priorities and Allocations System
CFIUS = Committee on Foreign Investment in the U.S.
HSR = Hart Scott Rodino

Introduction: The Functional Capability Concept and its Role in Industrial Base Planning

Value of the "Industrial Base Capabilities" Approach

- The approach enables the linking of defense strategy and vision to industrial policy

- Appropriately focuses industrial base assessments on the warfighting capabilities required—not vice versa



- Further benefits
  - Translates warfighting capabilities into associated technologies and industrial base capabilities, providing important investment guidance to the Department and industry
  - As end-to-end industrial base planning tool, can be adapted by other defense establishments for their own assessments/requirements

Source: Booz Allen Hamilton and ODUSD(IP)

Value of the DIBCS Body of Knowledge to Defense Planning in Other Settings

- Creates a comprehensive "menu" of 21st century warfighting capabilities
  - Organized by functional capabilities
  - Prioritized to highlight capabilities where the U.S. desires leadership by at least one technology generation
- Identified technologies associated with *Be Ahead/Be Way* Ahead warfighting capabilities
- As published, the DIBCS series provides warfighting capability and technology data easily adaptable to other nations'/organization's warfighting and industrial base capability planning
- DIBCS process methodology relating to industrial base assessments would translate directly to other nations' industrial base assessments—and to multilateral organizations, with modest changes

International Interest in DIBCS Process

Date	Event
2/23-25/04	Meetings in Singapore with Defense Officials during Asian Aerospace Exhibition
3/1-3/04	Meeting in Japan with Ministry of Economy, Trade, and Industry
8/10/04	Lunch with Danish Minister of Defense
9/22/04	Meeting with European Defense Agency Establishment Team
10/21/04	Briefing to Korean/U.S. Industrial Cooperation Committee
10/25/04	Meeting with Austrian National Armaments Director
10/26/04	Meeting with Australian Ministry of Defense
10/27/04	Meeting with Swedish Foreign Affairs and Defense Officials
11/8-12/04	Staff visited and briefed Australian Industry and Defense Officials
11/9/04	Speaker at European Institute Luncheon
12/3/04	Meeting with Austrian Trade Commission and Industry
12/9/04	Briefing to Polish Defense Attache
1/18/05	Briefing to German Ambassador and Staff
3/14/05	Workshop with Deputy Director of European Defense Agency and National Armament Directors/Representatives
4/27/05	German Ministry of Defense Discussions on Industrial Capabilities Planning

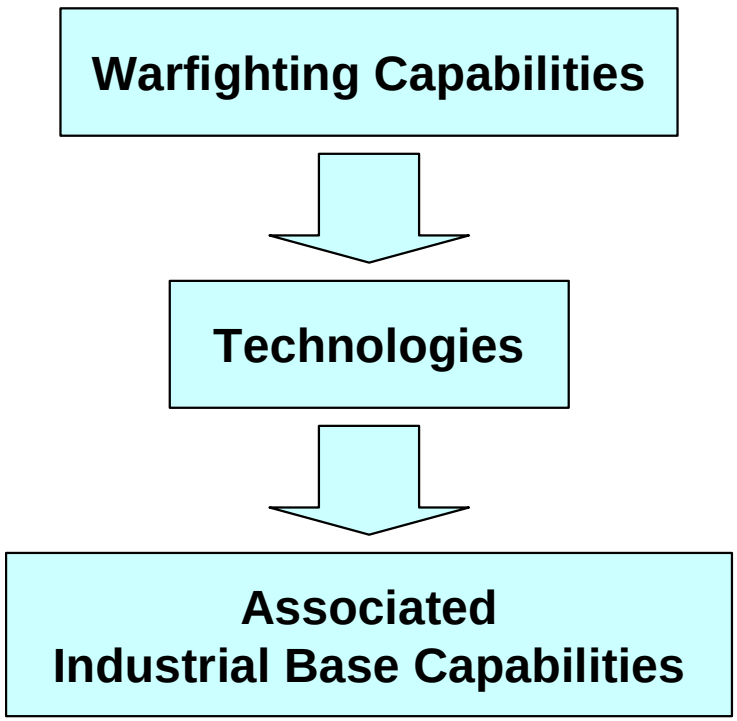
The Defense Industrial Base Capabilities Study (DIBCS) Methodology & Findings

Joint Staff Functional Concepts

Battlespace Awareness Global Hawk, DCGS, NPOESS, SBIRS-High, E-2 Advanced Hawkeye	Capabilities of commanders and force elements to understand their environment and the adversaries they face. Uses a variety of surveillance capabilities to gather information; a harmonized secure netcentric environment to manage this information; and a collection of capabilities to analyze, understand, and predict.
Command and Control FBCB2, AOC-WS, MPS	Capabilities that exercise authority and direction over forces to accomplish a mission. Involves planning, directing, coordinating, and controlling forces and operations. Provides the means to recognize what is needed and ensure that appropriate actions are taken.
Force Application JDAM, MM III, F/A-22, MH-60R, JSF, CVN21, FCS, GMLRS	Capabilities to engage adversaries with lethal and non-lethal methods across the entire spectrum of conflict. Includes all battlefield movement and dual-role offensive and defensive combat capabilities in land, sea, air, space, and information domains.
Protection ATIRCM/CMWS, PAC-3, Chem Demil	Capabilities that defend forces and U.S. territory from harm. Includes missile defense and infrastructure protection and other capabilities to thwart force application by an adversary.
Focused Logistics C-130, CH-47, GCSS, MPF, T-AKE, C-17, FMTV, MH-60S, C-5 RERP	Capabilities to deploy, redeploy, and sustain forces anywhere in or above the world for sustained, in-theater operations. Includes traditional mobility functions of airlift, sealift, and spacelift as well as short-haul (intra-theater and battlefield) transportation. Also includes logistics C2, training, equipping, feeding, supplying, maintaining and medical capabilities.

Source: Joint Staff Functional Concepts and ODUSD(IP)

DIBCS Methodology Overview



Description

Capabilities identified and prioritized according to leadership goals.
- Capabilities identified independent of platform or program solutions

Technologies identified for most important warfighting capabilities and prioritized

Industrial base capabilities assessed for the most important technologies

"This methodology is consistent with the operational ethos embodied in the U.S. defense industrial base: warfighting capabilities, and the warfighter as the primary constituent, must drive defense demand and the products the Department acquires."

Source: Booz Allen Hamilton and ODUSD(IP)

Defining Leadership Goals

Neutral	Position relative to potential adversaries is immaterial.
Equal	Desire capability at least as good as potential adversaries; systems are likely in a common technological generation.
Be Ahead	Desire a significant capability difference over potential adversaries; systems should likely lead by a technology generation or order of magnitude better performance in key attributes.
Be Way Ahead	Desire a very significant capability difference over potential adversaries; systems should likely lead by multiple technology generations or orders of magnitude in performance.

Source: Booz Allen Hamilton and ODUSD(IP)

DIBCS Methodology: Force Application Example

1 Identify U.S. Leadership Goals for Capabilities

DIBCS FA Comprehensive Capability Areas	Specific Capabilities by Leadership Goal			
	Neutral	Equal	Be Ahead	Be Way Ahead
Maneuver to Engage	0	33	39	25
Engagement Maneuvering	2	34	86	66
Engagement	5	175	267	304
1036 TOTAL	7	242	392	395

Decompose capabilities and identify functions to determine enabling technologies

2 Determine Enabling Technologies for Be Ahead/Be Way Ahead Capabilities

Critical Technology/ Industry List (212)

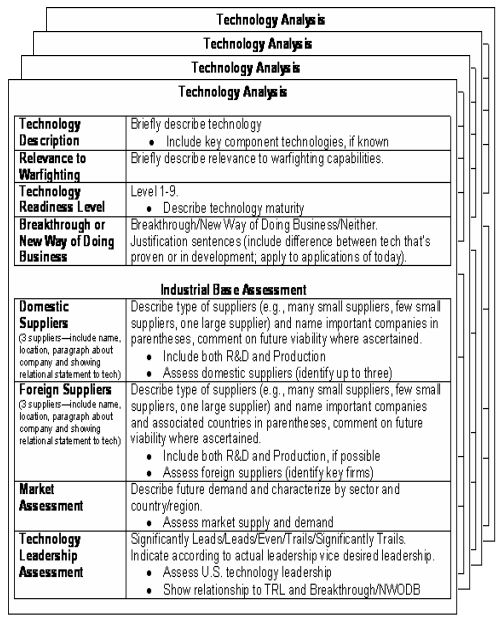
- Acoustic Energy Weapons
- Explosive Weapons
- Devices
- Guns/Cannons
- Kinetic Energy Weapons
- Optical Energy Weapons
- Propulsion
- RF Energy Weapons
- Special Purpose Weapons
- Structures
- Weapons Fuses
- Weapons Guidance and Control
- …

Prioritize technologies to focus and scope assessments

Priorities based upon:
- Type of capability enabled (*Be Ahead/Be Way Ahead*)
- Breakthrough or transformational nature of the technology
- Number capabilities enabled by technology (span of impact)

3 Assess Industrial Base Capabilities for Each Critical Technology

DIBCS Execution Team – a tailored team of experts
- Senior Advisory Group
- Program Manager and Core Team
- Operations/Policy and Technology Subject Matter Experts



Source: Booz Allen Hamilton and ODUSD(IP)

DIBCS Methodology: Results for Original Five Functional Concepts

Methodology Execution

List of key *(BA/BWA)* Capabilities	Identify Technology Solutions and Create Technology List	Prioritize Tech List and Down-select Initial Priority Assessment List	Elaborate on Key Components	Assess Industrial Base for Techs and Components

Sector	Total # Capa.	Be Ahead	Be Way Ahead
BA	436	169	188
C2	255	146	43
FA	1036	392	395
Prot	629	323	117
FL	525	254	17
Total	2881	1284	760

Sector	Number Techs
BA	278
C2	293
FA	212
Prot	277
FL	368
Total	1428

Sector	Techs Assessed
BA	31
C2	35
FA	32
Prot	39
FL	46
Total	183

Sector	Components Assessed
BA	41
C2	23
FA	29
Prot	25
FL	18
Total	136

Sector	Techs Sufficient	Potential Issues
BA	69	3
C2	55	3
FA	53	6 + 2WL
Prot	55	7 + 2WL
FL	TBD	TBD
Total	232	19 + 4WL

The DIBCS series complements ongoing Department-wide studies by mapping technology and industrial base capabilities to the new functional capabilities construct, providing a comprehensive baseline—and the long forward pass through 2020.

Source: Booz Allen Hamilton and ODUSD(IP)

BA & C2 Remedies

	Technologies	Industrial Base Sufficiency				Policy Levers		
		Phase	Domestic Sources	Foreign Sources		Fund Innovation	Optimize PM Structure & Acq Strategy	External Corrective Measures
Battlespace Awareness	Active Hyperspectral Imager	R&D	4	3		Invest in R&D technology using S&T portal	N/A	N/A
	Active Electronically Scanned Array (AESA) Radar	Prod	2 major	5		Promote investment in S&T for technologies that enable new applications	In near term programs, maximize competitive opportunities for weapon system design	Block teaming agreements for future competitions that do not increase innovation during weapon system design
	Maser Clocks	R&D	2	3		Invest in R&D and demo of technology using S&T portal	Provide competitive opportunities for this technology in weapon system design	N/A
Command & Control	Helmet Mounted Display	R&D/ Prod	5	4		Fund innovation in non-aviation applications	In near term programs, maximize competitive opportunities for weapon system design	Deny foreign acquisition of U.S. firms, particularly for non-aviation applications
	Swarming Control Tools	R&D	Many	Many		Invest in R&D to demonstrate technology and establish producers	Structure competitions to encourage new industry participants	Deny teaming agreements/ transactions that limit innovation
	Optical (Laser) Intersatellite Links	Prod	2	3		Continue investing in transition to manufacturing	Structure competitions to encourage new industry participants	Deny teaming agreements/ transactions that limit innovation

Source: Booz Allen Hamilton and ODUSD(IP)

FA Remedies

Technologies	Industrial Base Sufficiency				Policy Levers		
	Phase	Domestic Sources	Foreign Sources		Fund Innovation	Optimize PM Structure & Acq Strategy	External Corrective Measures
Pulsed Plasma Thruster	R&D	2[1]	0		Fund innovation as cooperative agreement with NASA.	Provide competitive opportunities for this technology in weapon system design.	Deny teaming agreements and transactions that limit innovation. Monitor export control.
Hypersonic Weapon Propulsion System	R&D	1	1		Invest in R&D to demonstrate technology and establish producers.	Provide competitive opportunities for this technology in weapon system design.	Deny teaming agreements and transactions that limit innovation. Monitor export control.
Small Caliber Projectile Control Surfaces	R&D	0[1]	0		Invest in R&D to demonstrate technology to gain sponsorship.	Structure competitions to foster the entry of additional sources.	Deny teaming agreements and transactions that limit innovation.
GPS-Guided Small Diameter Bomb (SDB)	R&D	1	0		Fund innovation by competitively establishing a second source.	Structure competitions to allow entry point for second source.	Monitor HSR to control second tier supplier consolidation.
Chemical Oxygen-Iodine Laser (COIL) (High/Low Power)	R&D	2 High 3[1] Low	0 High 3[1] Low		Fund demonstration of COIL for other warfighting applications.	Provide competitive opportunities for this technology in weapon system design.	Deny teaming that limits innovation; maintain present number of sources at minimum.
Self-Propagating High-Temperature Synthesis Device	R&D	1[1]	0[1]		Invest in R&D to demonstrate technology to gain sponsorship.	N/A	Stage competitions to add sources. Monitor export control.

[1] Additional R&D underway at other sources, not yet in production.

Source: Booz Allen Hamilton and ODUSD(IP)

Protection Remedies

Technologies	Industrial Base Sufficiency				Policy Levers		
	Technology Readiness Level (TRL)	Domestic Sources	Foreign Sources		Fund Innovation	Optimize PM Structure & Acq Strategy	External Corrective Measures
Non-Lethal Millimeter Wave Active Denial System	TRL 7	1	0		Invest R&D in additional sources to broaden industrial base and gain sponsorship.	Services conduct competitions to foster the entry of additional sources.	Consider for Militarily Critical Technology List. Monitor potential consolidation via HSR/CFIUS.
30-mm Supercavitating – Supersonic Projectiles	TRL 6	3	1[1]		Invest in R&D to establish U.S. technology leadership.	Conduct defense system design competitions for this technology.	Deny teaming arrangements and transactions that limit innovation; sustain sufficient suppliers.
Multi-Spectral Camouflage Cover	TRL 9	2	>3		Invest in R&D for next-generation camouflage; and to improve surveillance capabilities to defeat current camouflage.	Structure R&D investments to encourage competition and broaden the industrial base.	Monitor future foreign acquisition of U.S. suppliers. Monitor export control.
Regenerative Chemical-Biological Filtration	TRL 8	1	3		Fund development of additional U.S. sources.	Conduct defense system design competitions for this technology.	Deny teaming arrangements that limit innovation.
Plasma Antenna	TRL 6	3	3		Fund innovation to establish U.S. lead and adapt technology for additional applications.	Conduct defense system design competitions for this technology.	Deny teaming arrangements that limit innovation. Monitor export control.
Active Magnetic Signature Reduction System	TRL 9	2	>3		Invest in R&D to develop new U.S. suppliers, establish U.S. technology leadership, and improve sensors to defeat this technology.	Conduct defense system design competitions for this technology.	Deny teaming arrangements and transactions that limit competition. Monitor export control.
Thermo-Insulating Paint for Low Observable Hullforms	TRL 9	2	1		U.S. Navy should fund innovation to develop next-generation technological solution and U.S. sources.	U.S. Navy conduct defense system design competitions for next-generation technological solutions.	Deny teaming arrangements and transactions that limit competition. Monitor export control.

[1] Russia, France, Ukraine, and China may be working in this technology area. However, the limited publicly available information identified only one French research facility.

Source: Booz Allen Hamilton and ODUSD(IP)

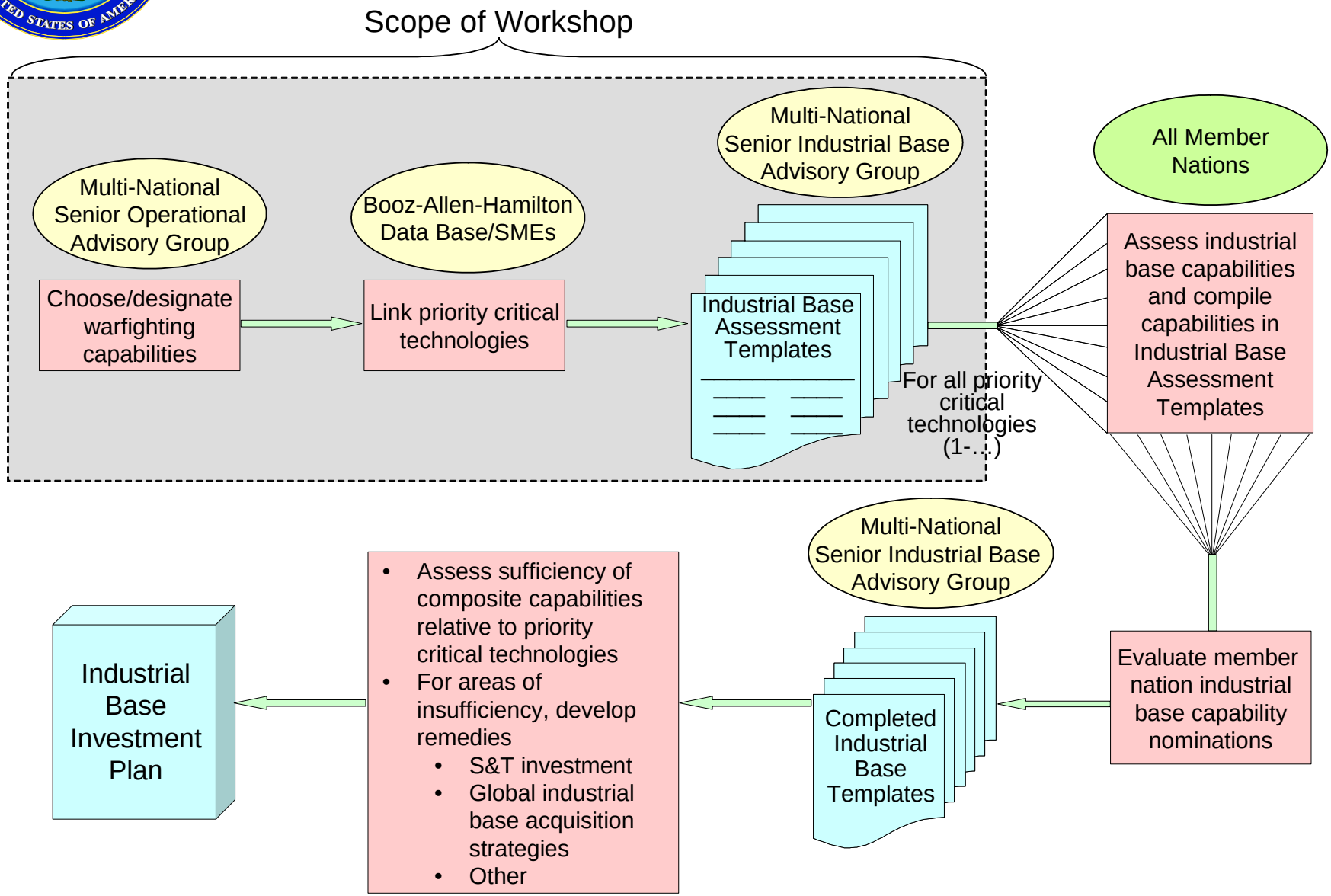
What Else Have We Learned?

What Else Have We Learned?

Examples of new insights into the industrial base via DIBCS:

- Importance of small and/or emerging suppliers (35-45% with less than 100 employees)
- Importance of protecting sufficient number of innovative sources for technologies still in R&D (e.g., swarming control tools)
- Importance of ensuring sufficient number of sources for widely-applied technologies (span of impact)

Notional Multi-National Industrial Base Assessment and Investment Strategy Process



Workshop on Defense Industrial Planning in a Multi-National Setting: Lessons Learned

Phase	Outputs

Assemble Senior Advisory Groups

Capabilities Senior Advisory Group		
Name	Position	Relevant Experience

Industrial Policy Senior Advisory Group		
Name	Position	Relevant Experience

- The capability to source knowledge leaders with relevant military capabilities and industrial base expertise in an American setting greatly benefits from the pool of retired Department and industry leadership available for such advisory roles. Such Advisory Groups may have to be composed of senior leaders currently in official positions—perhaps on a rotational or collateral basis—in European setting.
- Established practices in European multilateral government settings would require a formal nomination process that could be time consuming and contentious.
- In only a few cases, could it be established that individuals from one nation know the knowledge leaders from other nations who might be most suitable for such roles.

Assess Warfighting Capabilities Desired

Attack Sea Targets		

- Wide dispersion of capabilities prioritization with consensus about the least important capability.
- Cost-constrained thinking difficult to overcome.

Conduct Industrial Base Assessments

Structures

Propulsion

- Robust capability at national level to conduct industrial base assessments; however, considerable diversity in location of expertise/authority in industrial policy formulation.

Industrial Base Assessment Expertise			
Country	**Position**	**Country**	**Position**
Austria	Defense Industry Group	Poland	Ministry of National Defense
France	GGA, Procurement Agency	United Kingdom	Director of General Equipment
Greece	General Directorate for Defense Industry & Research	. . .	

The DIBCS Series as a Strategic Planning Tool

Crafting Defense Business Strategies by Functional Capability

Actor	Objective	Process
Corporations, the Defense Industrial Base, Defense Establishments, and Supranational Organizations	Develop business strategies based on consolidated view of existing capabilities relative to required capabilities.	• Assess industrial capabilities using warfighting capability and critical technologies framework for reference • Assess technological/industrial base sufficiency for required warfighting capabilities • Leverages work done in DIBCS series as basis for specific assessments • Harmonizes industrial base vernacular to benefit capability planning and industrial base access

Source: ODUSD(IP)

Appendix A & B - DIBCS Command & Control Capability Framework and Critical Technologies Organized by Broad Industrial Areas

Appendix A

DIBCS Command & Control Capability Framework

Monitor & Collect Data

An initial picture or impression developed by a commander of the operational environment by observing the situation and orchestrating the collection of different types of information from different sources.

Obtain Information on Adversary Forces and Assets
Equal

- Provide tasking to gather relevant Intelligence Preparation of Battlespace (IPB) concerning adversary states/actors/inhabitants of an area

Obtain Information on Adversary Forces and Assets
Be Ahead

- Provide tasking to locate, identify, track, and observe adversary forces/actors anywhere (all domains)/anytime in near-real-time; to include assessment of size, deployment, and status
- Provide tasking for persistent surveillance of adversary leadership figures, facilities, proliferation mechanisms and high value forces in the face of adversary denial and deception efforts
- Provide tasking to gather data concerning adversary intent and methodology for carrying out the movement, deployment, and maintenance of forces
- Provide tasking to identify all classes of targets and their status
- Provide tasking for early warning of hostile actions

Obtain Information on Adversary Forces and Assets
Be Way Ahead

- Provide shared control to synchronize cross-domain, cross-discipline collection efforts, execution of sensors, and exploitation of outputs
- Understand and detect potential adversaries' counter collection and denial (CC&D) against our monitor and collection capabilities
- Provide tasking to sense, identify, and track as necessary suspected CBRNE effluents, biomarkers, or facilities

Obtain Information on Non-Aligned Forces and Assets
Equal

- Provide tasking to gather relevant intelligence preparation of the battlefield (IPB) data concerning the non-aligned states/actors/inhabitants of an area

Obtain Information on Non-Aligned Forces and Assets
Be Ahead

- Provide tasking to locate, identify, track and observe non-aligned forces/actors anywhere (all domains)/anytime in near-real-time

Monitor & Collect Data – Continued

Obtain Information on Friendly Forces and Assets
Be Ahead

- Provide tasking to blue forces (Joint and Combined) to report location and status of friendly forces/actors -- prompt and timely, in many cases on a near-continuous/real-time basis

Obtain Geospatial Information
Equal

- Provide tasking to obtain precise mapping and geodesy information

Obtain Weather Information
Be Ahead

- Provide tasking to provide continuous, highly accurate information on current and projected environmental conditions that will affect the ability of assigned forces to plan, execute, and support the plan

Obtain Logistics Information
Neutral

- Task the engineering evaluation of structures to determine suitability for a particular use

Obtain Logistics Information
Be Ahead

- Task, collect, fuse, and assess friendly unit/equipment/weapon systems status reports (SORTS/SITREPS)
- Obtain data from logistics C2 systems to include total asset visibility, management for assets being processed, moved or stored from supplier to consumer, and in-transit tracking of mobility operations (Note: Logistics C2 is part of the Focused Logistics sector)

Obtain Political and Military Information
Equal

- Monitor and report world events and relevant government/public indicators/reactions relevant to the campaign

Appendix B

Critical Technologies for Command & Control Organized by Broad Industrial Areas

Communications and Networking

These technologies optimize communication channels in terms of their data throughput rates, capacity, security, and mobility. Bandwidth enhancers and bandwidth sharing tools expand the content and detail of the information being exchanged, as well as its update frequency. Wireless technology allows a channel to be established anywhere while robust security measures keep the data on that channel private.

3rd Generation Wireless Device (UWCC – 3G)	Digital Signal Processor
802.16-Compatible Device	Drive-by-Wire
Active Network Management Tool	Encrypted Switches
Adaptive Jitter Buffer	Extremely High Frequency (EHF) Transmitter/Receiver
Airborne Data Link	Frequency Hopping Equipment
Asset Preemption Tool	Global System for Mobile Communications (GSM) Phones
Automated Security Self-Evaluation Tool (ASSET)	Handheld, Portable Satellite Phone
Automatic Bandwidth Adjustment Tool	High Bandwidth Conduit
Automatic Fault Detection/Isolation/Correction Tool	High Bandwidth Router
Automatic Network Device Discovery and Configuration Tool	Infrared Wireless Communications Controller
Bandwidth Accelerator	Intersatellite Links
Bandwidth Compression Tool	Intraflight Data Link (IFDL)
Bandwidth Controller	Laser Communications (Lasercom)
Bandwidth on Demand Tool	Link Monitor Software
Beam Formation/Atmospheric Compensation Tool	Long-Wavelength Radio Transmitter/Receiver
Burst Communications Receiver/Transceiver	LPI/LPD Imagery Link
Channel Aggregation Tool	Microwave Link
Code Division Multiple Access (CDMA) Device	Monitoring Tool
Data Crosslink	Multiband Multiplexers

Data Management

In order to utilize the large volumes of data intrinsic to modern battlefield awareness, information must be securely saved and rapidly accessed. This requires hardware storage media to house the data and software to track, retrieve, and exploit the database information.

Activities Tracking Information Database	Machine Readable Cataloguing (MARC) Tool
Authentication Device	Massive Data Storage Device
Authorization Management and Advanced Access Control Models (AM&AACM)	Master Air Attack Plan (MAAP) Tool
Automated Data, Information & Information Request Tagging	Message Processing Tool
Compliance Management Software	Miniaturized Mass Storage Device
Consistent Data Playback Tool	Non-volatile RAM
Cryptographic Module Validation Program (CMVP)	Object Oriented Database
Data Conversion Tool	Optical Storage Device
Data Import/Export Tool	Parallel Data Processing/Data Reduction Software
Data Mining Software	Pattern Recognition Software
Data Synchronization Tool	Real-Time Data Handling/Storage Tool
Data Warehouse	Relational Database
Database Application Development Toolkit	Secure Database Replicator
Distributed Geospatial Meta Database	Secure Portable Data Storage Device
Document Tagging Tool	Social Software Analytics
Dynamic Database Fusion Tool	Spatial Indexing Software
High-Capacity On-board Satellite Data Storage	Temporal Indexing Software
High-Volume Imagery Database	Topicgraphical Indexing Software
Image Tagging Tool	Traffic Management Software
Intelligent Data Retrieval Tool	Web-enabled Timeline Analysis System (WebTAS)
Knowledge Management Software	

- Assess industrial capabilities by critical technologies using warfighting capability and critical technologies framework for reference
- Assess sufficiency

Source: Booz Allen Hamilton and ODUSD(IP)

Appendix C – A Compendium of Representative Defense Technology Suppliers with Transformational Capabilities

Appendix C

A Compendium of Representative Defense Technology Suppliers with Transformational Capabilities

Technology Suppliers[1]					
Company Name	**Est.**	**Location**	**Employees**	**Sales (US$M)**	**Website**
Collaboration Management - Collaborative Intelligence Fusion Tool					
Alcatel (Alsthom Group)	1985	Paris, France	60,486	15,731.0	www.alcatel.com
ALPHATECH, Inc.	1979	Arlington, VA	200	40.0	www.alphatech.com
BTG's Defense Intelligence Business Group	-	Fairfax, VA	-	-	web.btg.com
General Dynamics Advanced Information Systems	1952	Arlington, VA	67,600	16,617.0	www.gd-ais.com
QinetiQ, Ltd.	2001	Hampshire, UK	9,000	1,399.1	www.qinetiq.com
Swedish Defense Research Agency's FOI Stockholm Information Fusion Group	1986	Stockholm, Sweden	1,300	136.0	www.foa.se
Collaboration Management - Collaborative Virtual Workspace					
CACI International, Inc.	1962	Arlington, VA	7,500	843.1	www.caci.com
Citrix Systems, Inc.	1989	Fort Lauderdale, FL	1,885	588.6	www.citrix.com
Collaborative Laboratories for Europe (CIBIT): De Utrecht; Aspen Enterprises, Ltd.; Learning Futures	1988	Netherlands, Brent Knoll, U.K., Abersychan, Wales	70	n.a.	www.cibit.com www.aspen.uk.com www.learningfutures.ndirect.uk
MatrixOne, Inc.	1983	Westford, MA	450	109.4	www.matrixone.com
metalayer AG	1999	Zurich-Kloten, Switzerland	32	-	www.metalayer.com
Silverline Technologies, Ltd.	1997	Warwick, UK	22	3.6	www.silverline.com
Communications and Networking - Bandwidth Accelerator					
AirZip	2000	Berkshire, U.K.	10	0.7	www.airzip.com
Expand	1998	Roseland, NJ	40	4.0	www.expand.com
Flashnetworks	1996	Amsterdam, The Netherlands	80	-	www.flashnetworks.com
InterWAVE Communications Int'l, Ltd.	1994	Menlo Park, CA	195	30.0	www.iwv.com
Venturi Wireless	1996	Sunnyvale, CA	39	-	www.venturiwireless.com
Communications and Networking - Data Link - Airborne Data Link					
BAE Systems	1977	Bristol, U.K.	68,400	14,911.2	www.baesystems.com
BES Systems, Ltd.	1998	Givataim, Israel	20	3.0	www.bes.co.il
General Dynamics United Kingdom, Ltd.	1952	Oakdale, South Wales, U.K.	67,600	16,617.0	www.generaldynamics.uk.com
Harris Corporation	1895	Melbourne, FL	10,200	2,092.7	www.harris.com

[1] Companies listed are representative; the list is not exhaustive. Inclusion or exclusion does not imply future business opportunities with or endorsement by DoD. Sources include: Hoover's, AMADEUS (Analyse MAjor Databases from EUropean Sources), open source internet research, and telephone polling.

Technology Suppliers[1]					
Company Name	**Est.**	**Location**	**Employees**	**Sales (US$M)**	**Website**
Communications and Networking - Data Link - Airborne Data Link (continued)					
L-3 Communications (Communications Systems - West Division)	1997	Salt Lake City, UT	38,700	5,061.6	www.l-3.com/csw
The Aero Telemetry Corporation	-	Huntington Beach, CA	-	-	www.aerotelemetry.com
Communications and Networking - Data Link - Airborne Data Link - Field Programmable Gate Array					
Altera Corporation	1983	San Jose, CA	2,000	827.2	www.altera.com
Atmel Corporation	1984	San Jose, CA	7,900	1,330.6	www.atmel.com
Faraday Technology Corporation	1993	Hsinchu, Taiwan	462	96.2	www.faraday-tech.com
Toshiba Design & Manufacturing Service Corporation	1965	Tokyo, Japan	165,776	47,191.8	www.toshiba.com
Xilinx	1984	San Jose, CA	2,612	1,397.8	www.xilinx.com
Communications and Networking - Data Link - Airborne Data Link - Software-Definable Transceiver					
Allamat Electonic, Ltd.	-	Dobris, Czech Republic	-	-	www.allamat.cz
AMI Semiconductor Belgium BVBA	1966	Oudenaarde, Belgium	2,569	454.2	www.amis.com
MicroStrain, Inc.	1986	Burlington, VT	20	3.0	www.microstrain.com
Motorola	1953	Phoenix, AZ	88,000	27,058.0	www.motorola.com
Rohde & Schwarz GmbH & Co KG	1933	Munich, Germany	5,885	992.6	www.rsd.de
Silicon Laboratories, Inc.	1996	Austin, TX	486	325.3	www.silabs.com
Communications and Networking - Data Link - Intraflight Data Link (IFDL)					
Northrop Grumman	1929	Los Angeles, CA	123,000	26,200.0	www.northgrum.com
Symetrics Industries, LLC	1962	Melbourne, FL	70	18.0	www.symetrics.com
Communications and Networking - Optical Communications - Intersatellite Links					
Ball Aerospace Technologies Corporation	1956	Broomfield, CO	2,505	491.2	www.ball.com
Matra Marconi Space[2]	1990	Germany	3,670	-	www.matra-marconi-space.com
Northrop Grumman	1929	Redondo Beach, CA	123,000	26,200.0	www.northgrum.com
Oerlikon-Contraves Group	1936	Zurich, Switzerland	7,435	1,919.5	www.oerlikoncontraves.com
SINTEF	1950	Trondheim., Norway	1,700	-	www.sintef.no

[1] Companies listed are representative; the list is not exhaustive. Inclusion or exclusion does not imply future business opportunities with or endorsement by DoD. Sources include: Hoover's, AMADEUS (Analyse MAjor Databases from EUropean Sources), open source internet research, and telephone polling.
[2] Matra Marconi Space merged with EADS in 2003.

For peer assessment, potential joint ventures, merger and acquisitions strategies

Source: Booz Allen Hamilton and ODUSD(IP)